UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

COMMERZBANK AG, Plaintiff, -against- U.S. BANK NATIONAL ASSOCIATION., *et al.,* Defendants.	)	Case No. 16-cv-4569-WHP

REVISED SUPPLEMENTAL REBUTTAL EXPERT REPORT OF STEVEN R. GRENADIER, PH.D.

November 22, 2019

CONFIDENTIAL
PURSUANT TO STIPULATION AND ORDER

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I. Qualifications

1. I, Steven R. Grenadier, Ph.D., am the William F. Sharpe Professor of Financial Economics at the Graduate School of Business at Stanford University. I have been a member of the Stanford faculty since 1992, and serve as Chair of the Finance Department. My teaching and research focus on the area of investment analysis. While at Stanford, I have taught graduate-level courses in Investment Modeling, Portfolio Management, Real Estate Investment, and Finance Theory. In 1987, I graduated Phi Beta Kappa and *summa cum laude* from the University of California at Berkeley with a B.S. in Business Administration. In 1992, I received my Ph.D. in Business Economics (Finance) from Harvard University.

2. I have published numerous articles in finance and economics journals. I have spoken at numerous academic and business conferences about my research. I am the co-editor of the *Journal of Real Estate Finance and Economics*, a leading academic real estate journal. My research focuses on sophisticated valuation models of complicated financial structures and their empirical implications. I am a former Trustee of E*Trade Funds, Nicholas Applegate Institutional Funds, and AQR Funds. I also serve as a Senior Consultant to Financial Engines, Inc., an online investment advisor, and as a Senior Advisor to Cornerstone Research.

3. I have testified in matters pertaining to mortgage-related securities' performance and valuation. A more complete listing of my qualifications can be found in my Curriculum Vitae, attached as Appendix A. Appendix B contains a list of my testimony over the previous four years.

II. Relevant Background

4. The allegations in this case pertain to 56 trusts sponsored and securitized by various institutions for which U.S. Bank National Association and Bank of America, NA (as a successor of LaSalle Bank National Corporation) (collectively, "Defendants") serve or served as trustee.[1]

5. According to the Complaint, "Defendants, or a custodian acting on their behalf, had a duty to identify in final certifications and exception reports mortgage files that were missing documentation required to be delivered under the PSAs."[2] Loans with missing or defective documents were listed in these "exception reports" as having "document exceptions."[3] Plaintiff alleges that for loans with such document exceptions, "the Servicer and the Trustees were obligated to demand that the Sponsor cure the defect leading to the exception (typically within 90 days) or repurchase or substitute the defective loans."[4]

6. Allegedly, the exception reports for the at-issue trusts indicated that many loans had document exceptions at the time of securitization.[5] In the expert report by Ingrid Beckles dated April 2, 2019 ("Beckles Report"), the supplemental report by Ingrid Beckles dated May 28, 2019 ("Beckles Supplemental Report"), and the supplemental report by Ingrid Beckles dated September 27, 2019 ("Beckles Revised Supplemental Report"), Ms. Beckles concludes that

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[1] Complaint, *Commerzbank AG v. U.S. Bank National Association and Bank of America, NA,* filed December 28, 2015 ("Complaint"), ¶¶ 1, 21–22. I understand from counsel that CCMFC 2006-2 is no longer at issue in this matter.
[2] Complaint, ¶ 104.
[3] Complaint, ¶ 44.
[4] Complaint, ¶ 47.
[5] Complaint, ¶ 105.

"approximately 44% of the loans in the at-issue Trusts had material document exceptions."[6] In her Revised Supplemental Report, Ms. Beckles also finds that "the Seller failed to cure document exceptions for approximately 31% of the loans [with material document exceptions] underlying the at-issue Trusts."[7] Table 1 in the Beckles Report, Table 1 in the Beckles Supplemental Report, and Table 1 in the Beckles Revised Supplemental Report summarize her findings regarding the number of loans with allegedly material and uncured material exceptions for each trust.[8] Ms. Beckles claims that for loans with exceptions where "critical mortgage documents are missing or defective, the process of foreclosing on the property may be delayed causing unnecessary losses to the Trust."[9]

III. Assignment

7. I have been retained by counsel for Defendants to respond to Ms. Beckles' claim that she has identified certain document exceptions that if left uncured are material to the ability to complete the foreclosure process in a timely and cost effective manner.[10] Specifically, I have been asked to determine if such allegedly material exceptions that were not cured led to extended foreclosure timelines that caused additional losses relative to other loans in the at-issue trusts.[11]

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[6] Beckles Report, ¶¶ 16, 102, Beckles Supplemental Report, ¶¶ 17, 103, and Beckles Revised Supplemental Report ¶¶ 17, 103.

[7] Beckles Supplemental Report ¶¶ 17, 103. Ms. Beckles initially concluded that "32% of loans with exceptions were never cured." Beckles Report, ¶¶ 16, 102, and Beckles Supplemental Report ¶¶ 17, 103.

[8] For the remainder of this report, I refer to loans in the at-issue trusts with these allegedly material exceptions that are uncured as "loans with uncured exceptions." I refer to loans in the at-issue trusts without any allegedly material uncured exceptions as "loans without exceptions."

[9] Beckles Report, ¶ 92, Beckles Supplemental Report ¶ 93, and Beckles Revised Supplemental Report ¶ 93.

[10] Beckles Report, ¶¶ 92–102 and Table 1, Beckles Supplemental Report, ¶¶ 93–103 and Table 1, and Beckles Revised Supplemental Report ¶¶ 93–103 and Table 1.

[11] Counsel has informed me that expert discovery in this case is divided into two phases, with expert opinions regarding alleged damages to be offered during a later phase. In her reports, Ms. Beckles purports to calculate

8. I am being compensated at my standard billing rate of $950 per hour. I have been assisted in this matter by staff of Cornerstone Research, who worked under my direction. I receive compensation from Cornerstone Research based on its collected staff billings for its support of me in this matter. Neither my compensation in this matter nor my compensation from Cornerstone Research is in any way contingent or based on the content of my opinion or the outcome of this or any other matter.

9. The documents that I have relied upon to form my opinions are listed in Appendix C attached hereto. My work on this matter is ongoing. I reserve the right to modify or supplement my report if additional analysis, discovery, or testimony becomes available.

IV. Summary of Opinions

10. Ms. Beckles presents no empirical evidence that loans with uncured exceptions had extended foreclosure timelines that led to increased losses relative to loans without exceptions. In fact, a simple review of Ms. Beckles' data indicates that loans with uncured exceptions that were liquidated or real estate owned ("REO") did not have higher loss severity rates than loans without exceptions. Similarly, using Ms. Beckles' measure of foreclosure timelines, I find loans with uncured exceptions actually had average foreclosure timelines that were 24 days *shorter* than loans without exceptions.[12] I find that this lack of evidence that

losses arising out of foreclosures that exceeded GSE timelines. Beckles Report, ¶ 132 and Table 6, Beckles Supplemental Report, ¶ 133 and Table 6, and Beckles Revised Supplemental Report, ¶ 133 and Table 6. I reserve the right to respond to those opinions during expert discovery regarding damages.

[12] This difference is statistically significant. Throughout this report, I use a 95% confidence level for statistical tests, as is common practice in academic literature. A finding of statistical significance indicates the result is highly improbable to be due to random chance. Statistical significance does not necessarily imply that an estimated effect is large in an economic sense. Moreover, a 95% confidence level implies that there is a 5% chance of finding

uncured document exceptions led to extended foreclosure timelines is robust to controlling for the other determinants of foreclosure timelines identified by the Cordell et al. article Ms. Beckles cites and relies upon.[13] Overall, I find no support for the hypothesis that the uncured document exceptions Ms. Beckles identifies as "material" actually caused extended foreclosure timelines and increased losses relative to other loans.[14, 15]

V. Analysis of Loss Severity Rates and Foreclosure Durations for Loans with Uncured Exceptions

11. In her reports, Ms. Beckles claims to have identified loans that had "material" document exceptions and asserts that when "some of the critical mortgage documents are missing or defective, the process of foreclosing on the property may be delayed causing unnecessary losses to the Trust."[16] However, Ms. Beckles does not present any empirical evidence to support these claims. Instead, she simply summarizes her measure of foreclosure

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statistical significance for a given test when no relationship exists (i.e., a "false positive"). When running multiple tests, the odds of observing at least one false positive result is greater than the 5% level of each individual test. For example, when running 100 independent tests, one would expect to see 5 false positive results when using a test with a 95% confidence level even when no relationship exists. To alleviate this issue, researchers can apply a more stringent requirement for statistical significance in any single test. My results presented in this report are conservative in the sense that I have not implemented any such adjustment when reporting statistical significance. As a result, applying such a correction for multiple testing would not affect my conclusion that there is no reliable evidence that the document exceptions Ms. Beckles identifies as material actually caused extended foreclosure timelines or increased losses.

[13] See, Beckles Report, ¶¶ 130–2, Beckles Supplemental Report, ¶¶ 131–3, and Beckles Revised Supplemental Report, ¶¶ 131–3. Cordell, L. et al., "The Cost of Foreclosure Delay," Real Estate Economics, Vol. 43, 2015, pp. 916–56.

[14] Although Ms. Beckles does not present liquidation/REO figures for all loans with material exceptions, I have also performed versions of my analyses that compare all loans with material exceptions (not just uncured exceptions) with other loans. These results are presented in Appendix D and similarly do not provide any reliable basis to conclude that material exceptions lead to extended foreclosure timelines.

[15] The analyses presented in Exhibits 1–4 below compare loans with uncured exceptions versus other loans, including those that Ms. Beckles identifies as having material exceptions that were cured. My conclusions would remain unchanged if I instead compared loans with uncured exceptions versus loans that Ms. Beckles did not identify as having any allegedly material exceptions.

[16] Beckles Report, ¶¶ 92, 98, Beckles Supplemental Report, ¶¶ 93, 99, and Beckles Revised Supplemental Report, ¶¶ 93, 99.

timelines for all liquidated/REO loans in the at-issue trusts and compares these timelines to certain government sponsored enterprise ("GSE") benchmarks.[17]

12. Contrary to Ms. Beckles' purported theory, my analysis of her data indicates that loans with uncured exceptions that were liquidated/REO did not have higher loss severity rates than loans without exceptions. Moreover, I find no evidence that loans with uncured exceptions have extended foreclosure timelines relative to loans without exceptions.[18, 19]

A. Loans with Uncured Exceptions Are Not Associated with Higher Loss Severity Rates

13. As a starting point for my analysis, I consider the basic question of whether loans with uncured exceptions that have completed the foreclosure process had higher loss severity rates than loans without exceptions. For the purposes of this analysis, I rely on Ms. Beckles' identification of loans that had uncured exceptions and her identification of loans that have gone through a foreclosure ending in a liquidation or REO. I also rely on the loss severity rates Ms. Beckles included in her reports' backup materials.[20] If Ms. Beckles were correct that the uncured

[17] Beckles Report, ¶ 129, Beckles Supplemental Report, ¶ 130, and Beckles Revised Supplemental Report ¶ 130.

[18] The analyses discussed in this report focus on Ms. Beckles' determination of which loans went through a foreclosure process that ended in either liquidation or REO. I understand from counsel that a servicing expert retained by Defendants has identified certain errors such that Ms. Beckles improperly included certain loans in her analyses. I found that excluding these loans would not have affected the conclusions I draw in this report.

[19] The analyses described in this report focus on trusts for which Ms. Beckles' uncured exception flag could be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans. This restriction excludes six at-issue trusts, including two trusts for which Ms. Beckles has no foreclosure timeline data, three trusts for which Ms. Beckles' uncured exception flag could not be matched to CoreLogic for any of loans, and one trust for which Ms. Beckles' uncured exception flag could be matched to CoreLogic for only 15% of loans. Changing this 90% match rate threshold to 100% (rounded to the nearest whole percentage point) would exclude nine additional trusts and would not affect any of the conclusions I draw in this report.

[20] The loss severity rates in Ms. Beckles' data are computed as of the month of liquidation. That is, the loss severity rate for a given loan in Ms. Beckles' data is defined as the losses reported in the month of liquidation divided by the unpaid balance as of the month of liquidation. I have also analyzed alternative loss severity rates using CoreLogic data that are computed as total cumulative losses for a given loan as of the last month that loan appears in the data divided by the unpaid balance as of the beginning of Ms. Beckles' foreclosure timeline. All of my conclusions in this section are unchanged when using this alternative measure.

exceptions she has identified caused incremental losses by extending foreclosure timelines, I would expect to see loans with uncured exceptions having higher loss rates in her data.

14. Exhibit 1 displays this simple comparison of loss severity rates for loans with uncured exceptions to loans without exceptions using Ms. Beckles' data. The first row of the exhibit shows that the average loss severity rate for loans with uncured exceptions was 70.3% as compared to 71.9% for loans without exceptions. That is, loans with uncured exceptions had average loss severity rates that were roughly 1.6% *lower* than loans without exceptions, and this difference is statistically significant.

15. The second row of Exhibit 1 displays the same comparison but using medians rather than averages. Medians provide an alternative measure of centrality that is less affected by outliers than averages. If the comparisons using averages were driven by outliers, I would expect the results using medians to be very different, but they are not. The median loss severity rate for loans with uncured exceptions was 70.5% as compared to the higher median loss severity rate of 71.6% for loans without exceptions. This difference is also statistically significant.

16. Overall, this evidence provides no support for the hypothesis that the uncured document exceptions Ms. Beckles has identified led to higher losses on loans that went through foreclosure.

B. Loans with Uncured Exceptions Are Not Associated with Longer Foreclosure Timelines

17. Next, I consider whether loans with uncured exceptions had longer foreclosure timelines. For this analysis, I rely on Ms. Beckles' calculation of foreclosure timelines for loans

that underwent a foreclosure ending in liquidation or REO. Although Ms. Beckles computes foreclosure timelines for all loans in the at-issue trusts that she determines were liquidated or placed in REO status,[21] she does not present a comparison of foreclosure timelines for loans with and without uncured exceptions. If the uncured document exceptions Ms. Beckles identifies did actually prolong the foreclosure process, I would expect her data to show that loans with uncured exceptions have longer foreclosure timelines than loans without exceptions.

18. As shown in Exhibit 2, Ms. Beckles' data indicate that loans with uncured exceptions, in fact, had shorter average foreclosure timelines.[22] In particular, average foreclosure timelines for loans with uncured exceptions were 591 days as compared with 615 days for loans without exceptions. This difference of 24 days (or roughly 4%) is statistically significant. Overall, this simple comparison using Ms. Beckles' own data is not consistent with the hypothesis that uncured exceptions were associated with extended foreclosure timelines. Exhibit 2 further illustrates this point by using medians rather than averages. To the extent that the results when comparing average duration are driven by a relatively small number of loans with very long foreclosure durations, one would expect those results to become less pronounced when considering medians. However, Exhibit 2 demonstrates that is not the case, as the results using medians are qualitatively similar to those using averages. In particular, the median foreclosure

[21] Beckles Report, ¶ 129 and Table 5, Beckles Supplemental Report, ¶ 130 and Table 5, and Beckles Revised Supplemental Report, ¶ 130 and Table 5.

[22] Ms. Beckles reduces foreclosure durations for loans in certain areas that experienced natural disasters such as hurricanes. Beckles Report, ¶ 123, Beckles Supplemental Report, ¶ 124, and Beckles Revised Supplemental Report, ¶ 124. Ms. Beckles states that this adjustment is to account for certain delays that are allowed under the GSE foreclosure duration guidelines she uses as a benchmark. Beckles Report, ¶ 128, Beckles Supplemental Report, ¶ 129, and Beckles Revised Supplemental Report, ¶ 129. Because they are not being compared to Ms. Beckles' GSE benchmark, the foreclosure duration numbers reported in Exhibit 2 do not incorporate Ms. Beckles' natural disaster adjustment, but I find that applying this adjustment would not affect my conclusions.

timeline for loans with uncured exceptions was 30 days shorter than the median foreclosure timeline for loans without exceptions. This difference is statistically significant.

19. In her reports, Ms. Beckles also compares foreclosure timelines for liquidated/REO loans in the at-issue trusts to what she describes as "industry standard benchmarks published by the GSEs" that vary across states and over time.[23] Based on these comparisons, Ms. Beckles concludes that the "level of non-compliance with these [benchmarks] violates prudent servicing standards."[24]

20. Exhibit 3 considers whether the results in Exhibit 2 are robust to considering the GSE benchmarks Ms. Beckles relies upon.[25] In particular, Exhibit 3 presents figures for foreclosure timelines net of the GSE benchmarks calculated by Ms. Beckles. The first row of the exhibit shows that 62% of loans with uncured exceptions exceeded GSE benchmarks as compared to 63% for loans without exceptions. This difference of 1% is statistically significant. The exhibit further shows that the average foreclosure durations net of GSE guidelines for loans with uncured exceptions was 11 days shorter than for loans without exceptions. Similarly, the median foreclosure duration net of GSE guidelines was 11 days shorter for loans with uncured exceptions. Both differences are statistically significant. Finally, Exhibit 3 shows that among loans that exceeded the GSE guidelines, the average number of days by which the guidelines

[23] As discussed above, Ms. Beckles reduces foreclosure durations for loans in certain areas that experienced natural disasters such as hurricanes to account for natural disaster moratoria that she states led to allowable delays under GSE guidelines. In addition, Ms. Beckles extends GSE foreclosure duration benchmarks for bankruptcies, which she states are allowable delays under GSE guidelines. Beckles Report, ¶ 128, Beckles Supplemental Report, ¶ 129, and Beckles Revised Supplemental Report, ¶ 129. I offer no opinion as to whether either of these adjustments were implemented correctly or whether Ms. Beckles accounted for all allowable delays under GSE guidelines.

[24] Beckles Report, ¶ 129, Beckles Supplemental Report, ¶ 130, and Beckles Revised Supplemental Report, ¶ 130.

[25] For the purposes of my analysis, I take Ms. Beckles' GSE benchmarks as given and offer no opinion on whether she calculates them correctly or whether it is appropriate to apply them to loans in the at-issue trusts.

were exceeded was lower for loans with uncured exceptions as compared to loans without exceptions. Again, the result is statistically significant.

21. Consistent with my findings for loss severity rates, the summary statistics presented in Exhibits 2 and 3 provide no support for the hypothesis that the uncured document exceptions Ms. Beckles has identified led to extended foreclosure timelines.

C. Foreclosure Durations of Loans with Uncured Exceptions and Loans Without Exceptions Are Similar when Controlling for Other Factors

22. While Ms. Beckles' data indicates that loans with uncured exceptions do not have longer foreclosure timelines, it is possible that this finding is driven by other systematic differences between loans with uncured exceptions and loans without exceptions. As a robustness check on the preceding results, I conduct a regression analysis that controls for other factors. In particular, I control for the factors discussed in the Cordell et al. article that Ms. Beckles relies upon for estimating the costs of allegedly excessive foreclosure timelines for the loans in the at-issue trusts.[26] This article measures the cost of foreclosure delay by estimating a model that accounts for various potential determinants of foreclosure timelines. Based on their analysis, the authors conclude that "[t]he large volume of foreclosures, coupled with an unprecedented series of government interventions in mortgage servicing practices, significantly extended foreclosure timelines during and after the crisis."[27]

[26] See, Beckles Report, ¶¶ 130–2, Beckles Supplemental Report, ¶¶ 131–3, and Beckles Revised Supplemental Report, ¶¶ 131–3.
[27] Cordell et al. (2015), p. 916.

23. Cordell et al. highlight two key determinants of foreclosure timelines. First, foreclosure laws vary substantially across different states, and as a result, they argue that the state where a property is located has a major impact on its foreclosure timeline. In particular, Cordell et al. explain that in states with "judicial" foreclosure laws "the lender must petition the court, which then executes the foreclosure by auctioning the property."[28] In contrast, in states with "non-judicial" foreclosure laws, "the borrower (at origination) signs over the right to the lender to carry out a foreclosure auction in the event of default, effectively eliminating judicial intervention."[29] Consistent with this, Cordell et al. find that foreclosure timelines are longer in judicial states as compared to non-judicial states.[30]

24. The second key determinant of foreclosure timelines highlighted by Cordell et al. is the date when the foreclosure timeline started. The article shows that starting around November 2008, foreclosure timelines steadily increased through the end of the data sample in September 2013.[31] The authors discuss that these industry-wide increases in foreclosure timelines over this period were driven by "a combination of limited mortgage servicer capacity and an extraordinary series of government interventions in the practices of managing delinquent loans to mitigate these foreclosures."[32] Cordell et al. further explain that as the crisis unfolded:

> Servicers, traditionally payment collectors for performing loans, were being asked to underwrite millions of modifications, but did not have the infrastructure for doing so on such a massive scale. As home prices began to fall and defaults rose, it became clear how large the number of

[28] Cordell et al. (2015), p. 921.
[29] Cordell et al. (2015), p. 921.
[30] Cordell et al. (2015), p. 923.
[31] Cordell et al. (2015), Figure 2.
[32] Cordell et al. (2015), p. 916.

> displaced homeowners would be if extraordinary measures were not taken. Public policy turned its attention to finding ways to keep borrowers in their homes through foreclosure moratoria, changes to foreclosure practices, and mortgage modification programs.[33]

25. In addition to controlling for state and time period, the Cordell et al. foreclosure timeline model controls for a number of loan-level and borrower risk characteristics. These characteristics include the loan-to-value ratio ("LTV"), borrower credit ("FICO") score, loan balance, loan product type, loan purpose, property type, and occupancy status.[34] The Cordell et al. model also includes two macroeconomic factors: changes in house prices and unemployment rates in the year leading up to the delinquency event.[35]

26. To determine whether uncured exceptions are associated with longer foreclosure timelines controlling for other potentially relevant factors, I estimate a regression model that accounts for the factors discussed in the Cordell et al. article. I add an indicator for whether the loan had an allegedly material uncured exception as defined in the Beckles Revised Supplemental Report ("uncured exception flag"). The coefficient on this variable indicates whether loans with uncured exceptions have different foreclosure durations as compared to loans without exceptions.

27. Panel A of Exhibit 4 presents the results of the regression model as applied to Ms. Beckles' data on foreclosure timelines of loans that have gone through a foreclosure process ending in liquidation or REO. The exhibit displays the coefficients on the uncured exception

[33] Cordell et al. (2015), p. 916.
[34] Cordell et al. (2015), p. 930.
[35] Cordell et al. (2015), p. 930.

flag for several specifications. I present the results of models estimated separately for judicial and non-judicial states, following Cordell et al., in addition to results for all states combined.[36] Across the three sets of results shown in the first row of Exhibit 4, the coefficient on the uncured exception flag ranged from -0.010 to 0.000. These estimates imply that holding all other factors constant, loans with uncured exceptions are associated with foreclosure timelines that are between 1.0% shorter to almost the same length as loans without exceptions. As shown in the exhibit, at the average foreclosure duration for loans with uncured exceptions, these estimates would imply only a very small impact on foreclosure timelines of between -8.2 days and 0.2 days. However, none of these estimates is statistically significant, indicating that the foreclosure durations of loans with uncured exceptions and loans without exceptions are statistically indistinguishable.

28. The next two rows of Exhibit 4 present additional robustness checks on these model results. The second row reports results from a version of the model in which I add deal indicator variables in order to account for differences across trusts that are not captured by the factors discussed in the Cordell et al article, such as differences in servicers, originators, or asset types. The third row shows results from specifications of the model that additionally incorporate Ms. Beckles' disaster moratoria adjustment.[37] These additional specifications confirm my primary finding that there is no consistent relationship between uncured exceptions and foreclosure durations because none of the coefficients on the uncured exception flags are significant.

[36] Cordell et al. (2015), p. 930.
[37] See n. 22.

29. Since Ms. Beckles only defines foreclosure duration for loans that "hav[e] gone through a foreclosure that ended in REO or liquidation,"[38] loans that are still in foreclosure as of the last available date do not have data for foreclosure duration and are not included in Ms. Beckles' sample. Therefore, my analyses exclude such loans as well. However, Cordell et al. do consider such "censored" loans that are still in foreclosure as of the last month in the data.[39] In order to check whether the preceding results are robust to the inclusion of such loans, I repeat the analyses described above on a larger sample that includes both the loans identified by Ms. Beckles for her timeline analysis as well as such "censored" loans.[40] The results are shown in the first row of the bottom panel of Exhibit 4 and do not lead to different conclusions. The coefficients range from 0.003 to 0.010, implying that holding all other factors constant, loans with uncured exceptions are associated with foreclosure timelines that are between 0.3% longer to 1.0% longer than loans without exceptions. At the average foreclosure duration for loans with uncured exceptions, these estimates still imply only a very small impact on foreclosure timelines of between 2.9 days and 4.6 days. However, none of these estimates is statistically significant, indicating that the difference in foreclosure timelines between loans with uncured exceptions and loans without exceptions is statistically indistinguishable from zero.

[38] Beckles Report, Table 5, n. 2, Beckles Supplemental Report, Table 5, n. 2, and Beckles Revised Supplemental Report, Table 5, n. 2.

[39] Cordell et al. (2015), p. 928.

[40] I identified "censored" loans as loans in Ms. Beckles' raw data that are either at least 90 days delinquent or in foreclosure as of the last month in the data. I also consider loans as censored if their last observed status was bankruptcy and they were either at least 90 days delinquent or in foreclosure immediately prior to bankruptcy. I identified 5,317 such censored loans that were added to the sample for the regression analyses summarized in the bottom panel of Exhibit 4. I also considered an alternative definition where loans were identified as censored if they were at least 150 days delinquent (the most severe delinquency status recorded in Ms. Beckles' data) or in foreclosure as of the last observed status in Ms. Beckles' data. Using this alternative definition of censored loans does not affect my conclusions.

30. Based on these findings, the conclusion that loans with uncured exceptions do not have extended foreclosure durations relative to loans without exceptions is robust to accounting for other factors that may affect the length of foreclosure timelines.

VI. Conclusion

31. Overall, I find no support for the hypothesis that the uncured exceptions Ms. Beckles opines were "material" actually led to extended foreclosure timelines that caused increased losses to the at-issue trusts. In fact, loans with uncured exceptions that went through a foreclosure process ending in a liquidation or REO had lower loss severity rates on average than loans without exceptions. In addition, loans with uncured exceptions actually had shorter average foreclosure timelines than loans without exceptions. The conclusion that uncured exceptions do not lead to extended foreclosure timelines is robust to considering the GSE benchmarks Ms. Beckles employs and to controlling for the other factors discussed in the academic article Ms. Beckles relies upon.

Dated: November 22, 2019

Steven R. Grenadier

APPENDIX A

CURRICULUM VITA: June 2018

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CURRENT POSITIONS

William F. Sharpe Professor of Financial Economics, Graduate School of Business, Stanford University

Chairman of Finance Department, Graduate School of Business, Stanford University

FIELDS OF SPECIALIZATION

Corporate Finance
Asset Pricing
Portfolio Management
Options
Real Estate

DOCTORAL STUDIES

Harvard Business School/Harvard Graduate School of Arts and Science

Ph.D. in Business Economics, November 1992
Concentration in Capital Markets and Corporate Finance

Dissertation: Real Estate Markets
Committee Chairman: Robert C. Merton

UNDERGRADUATE EDUCATION

University of California at Berkeley

B.S. 1987 - Summa cum laude

HONORS

The article "The Strategic Exercise of Options: Development Cascades and Overbuilding in Real Estate Markets," was nominated for the Smith Breeden Prize of the Journal of Finance in 1997

1994 Best Paper Award from the American Real Estate and Urban Economics Association and the American Institute of Individual Investors

1993 Best Dissertation Award from the American Real Estate and Urban Economics Association

National Doctoral Fellowship Recipient: American Assembly of Collegiate Schools of Business

Phi Beta Kappa

PUBLICATIONS

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APPENDIX A

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WORKING PAPERS

"Capital budgeting and Real Options: The Case of Concealed Investment Projects," with Andrey Malenko.

"Sandbagging Real Options," with William Cong.

EDITORIAL RESPONSIBILITIES

Editor, *Journal of Real Estate Finance and Economics*, 1996-
Associate Editor, *Journal of Economic Dynamics and Control*, 2003-2010

PROFESSIONAL ACTIVITIES

Chairman of the Finance Department, Graduate School of Business, Stanford University: 2003-2006, 2011-
Trustee of AQR Funds: 2008-2011
Trustee of E*Trade Funds: 1999-2009
Senior Consultant: Financial Engines, Inc.: 1997-
Trustee of Nicholas Applegate Institutional Funds: 2007-2010
Member of the Stanford University Retirement Program Investment Committee, 2005-2011
Consultant to Applied Materials
Consultant to Shell Capital
Consultant to Zevenbergen Capital

TEACHING EXPERIENCE

Modeling for Investment Management: 2009-
Critical Analytical Thinking: 2010-2012
Portfolio Management: 1992-2006
Essentials of Real Estate Investment: 1994-2009
Foundations of Financial Economics: 1995-1997, 2006-
Finance Core: 1993

PRESENTATIONS

Brigham Young University
Carnegie Mellon University
Columbia University (2 seminars)
Harvard Business School (2 seminars)
Massachusetts Institute of Technology
Northwestern University (2 seminars)
Ohio State University
Southern Methodist University
Stanford University

APPENDIX A

University of British Columbia (2 seminars)
University of California at Berkeley (3 seminars)
University of California at Los Angeles (3 seminars)
University of Chicago (2 seminars)
University of Connecticut (3 seminars)
University of Illinois
University of Minnesota
University of Oregon
University of Pennsylvania (3 seminars)
University of Rochester
University of Southern California
University of Texas at Austin
University of Utah
University of Wisconsin (2 seminars)
Yale University (2 seminars)

APPENDIX B

Steven Grenadier
Prior Testimony in Previous Four Years

Federal Home Loan Bank of Seattle v. Bear, Stearns & Co., Inc., et al., Case No. 09-2-46298-4 SEA (Wash. Super. Ct.). Deposition: 2015.

Steven A. Stender, et al. v. Archstone-Smith Operating Trust, et al., Case No. 07-cv-02503 (D. Colo.). Deposition: 2015.

California Public Employees' Retirement System v. Moody's Corp., et al., Case No. CGC-09-490241 (Cal. Super. Ct.). Deposition: 2016.

MBIA Insurance Corporation v. Credit Suisse Securities (USA) LLC, DLJ Mortgage Capital, Inc., and Select Portfolio Servicing, Inc., Index No. 603751/09 (Supreme Court of the State of New York, County of New York). Deposition: March 2016.

Children's Mercy Hospital v. Morgan Stanley & Co LLC. f/k/a Morgan Stanley & Co Incorporated, Case Number: 13-01957 (Financial Industry Regulatory Authority Arbitration). Arbitration: March 2016.

The Bank of New York Mellon, solely as Securities Administrator for J.P. Morgan Mortgage Acquisition Trust, Series 2006-WMC4, v. WMC Mortgage, LLC, J.P. Morgan Mortgage Acquisition Corporation and J.P. Morgan Chase Bank, N.A., Case No. 654464/2012 (Supreme Court Of The State Of New York County Of New York). Deposition: October 2016.

In Re Allergan, Inc. Proxy Violation Securities Litigation, Case No. 8:14-cv-2004-DOC (U.S. District Court Central District of California, Southern Division). Deposition: June 2017.

Mary Bell, Janice Grider, Cindy Prokish, John A. Hoffman, and Pamela M. Leinonen v. ATH Holding Company, LLC, Board of Directors of ATH Holding Company, LLC, and Pension Committee of ATH Holding Company, LLC, Case No. 1:15-cv-02062-TWP-MPB (U.S. District Court Southern District of Indiana, Indianapolis Division). Deposition: September 2018.

Move, Inc. v. Citigroup Global Markets, Inc., Case No. 08-0335 (State of California, LA Division). FINRA Dispute Resolution Testimony: December 2018.

Duane & Virginia Lanier Trust, et al., v. SandRidge Mississippian Trust I, et al., Case No. 5:15-cv-00634-G (U.S. District Court Western District of Oklahoma). Deposition: June 2019.

In re SandRidge Energy, Inc. Securities Litigation, Case No.: 5:12-cv-01341-G (U.S. District Court Western District of Oklahoma). Deposition: June 2019.

APPENDIX B

MBIA Insurance Corporation v. Credit Suisse Securities (USA) LLC, DLJ Mortgage Capital, Inc. and Select Portfolio Servicing, Inc., Case No. 603751/2009 (Supreme Court of The State Of New York County Of New York). Trial Testimony: August 2019

APPENDIX C

List of Documents Relied Upon

ACADEMIC ARTICLES

Cordell, L. et al., "The Cost of Foreclosure Delay," Real Estate Economics, Vol. 43, 2015, pp. 916–956.

DATA SOURCES

CoreLogic

Housing Price Index Data, Federal Housing Finance Agency, http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx

National County Mapping Data, U.S. Census Bureau, https://www2.census.gov/geo/docs/reference/codes/files/

Unemployment Statistics, Bureau of Labor Statistics, U.S. Department of Labor, https://download.bls.gov/pub/time.series/la/

USPS Zip Code Data, Office of Policy Development and Research, U.S. Department of Housing and Urban Development, https://www.huduser.gov/portal/datasets/usps_crosswalk.html

LEGAL PLEADINGS AND EXPERT REPORTS

Complaint, *Commerzbank AG v. U.S. Bank National Association and Bank of America, NA*, filed December 28, 2015.

Expert Report of Ingrid Beckles, April 2, 2019.

Supplemental Expert Report of Ingrid Beckles, May 28, 2019.

Supplemental Expert Report of Ingrid Beckles, September 27, 2019.

OTHER

List of Loans Identified to be Excluded by Defendants' Servicing Expert

APPENDIX D1

Summary of Loss Severity Rates [1]

Loans with Material Exceptions vs. Loans without Material Exceptions

	Loans with Material Exceptions [2]	Loans without Material Exceptions [2]	Difference [3]
Average Loss Severity Rate	70.8%	72.7%	-1.8% *
Median Loss Severity Rate	70.9%	71.9%	-1.0% *
Number of Loans	29,128	36,646	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19
Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Loss severity rates are taken from Ms. Beckles' data and are defined for a given loan as the losses reported in the month of liquidation divided by the unpaid balance as of the month of liquidation.

[2] Loans with and without material exceptions are identified by Ms. Beckles. Four deals are excluded for which Ms. Beckles stated that some or all of the final exception reports were unavailable or not in a useable form (MABS 2006-AM2, MABS 2006-AM3, HEAT 2005-2 and HEAT 2005-4) and two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are seven deals for which Ms. Beckles' material exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, CMLTI 2005-HE1, CMLTI 2006-AR7, CMLTI 2007-WFH1, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have material exceptions (CHASE 2006-A1, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average loss severity rate. A two-sample median test is conducted to test the significance of the difference in median loss severity rate, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

APPENDIX D2

Summary of Foreclosure Duration [1]

Loans with Material Exceptions vs. Loans without Material Exceptions

(duration figures in days)

	Loans with Material Exceptions [2]	Loans without Material Exceptions [2]	Difference [3]
Average Foreclosure Duration	617	615	1
Median Foreclosure Duration	427	428	-1 *
Number of Loans	29,128	36,646	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19
Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Foreclosure duration is calculated as the number of days between the last payment date and the first liquidation or REO, as determined by Ms. Beckles.

[2] Loans with and without material exceptions are identified by Ms. Beckles. Four deals are excluded for which Ms. Beckles stated that some or all of the final exception reports were unavailable or not in a useable form (MABS 2006-AM2, MABS 2006-AM3, HEAT 2005-2 and HEAT 2005-4) and two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are seven deals for which Ms. Beckles' material exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, CMLTI 2005-HE1, CMLTI 2006-AR7, CMLTI 2007-WFH1, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have material exceptions (CHASE 2006-A1, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average foreclosure duration. A two-sample median test is conducted to test the significance of the difference in median foreclosure duration, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

APPENDIX D3

Summary of Foreclosure Duration Net of GSE Guidelines [1]

Loans with Material Exceptions vs. Loans without Material Exceptions

(duration figures in days)

	Loans with Material Exceptions [2]	Loans without Material Exceptions [2]	Difference [3]
Percent of Loans Exceeding Guidelines	63%	64%	-1% *
Panel A: All Liquidated/REO Loans			
Average Foreclosure Duration Net of GSE Guidelines	190	187	3
Median Foreclosure Duration Net of GSE Guidelines	39	60	-21 *
Number of Loans	29,128	36,646	
Panel B: Loans with Foreclosure Duration Exceeding Guidelines			
Average Foreclosure Duration Net of GSE Guidelines	354	346	7
Median Foreclosure Duration Net of GSE Guidelines	186	188	-2
Number of Loans	18,298	23,314	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19

Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with last payment date not exceeding the date of first REO or liquidation. Foreclosure duration net of GSE guidelines is calculated by Ms. Beckles.

[2] Loans with and without material exceptions are identified by Ms. Beckles. Four deals are excluded for which Ms. Beckles stated that some or all of the final exception reports were unavailable or not in a useable form (MABS 2006-AM2, MABS 2006-AM3, HEAT 2005-2 and HEAT 2005-4) and two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are seven deals for which Ms. Beckles' material exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, CMLTI 2005-HE1, CMLTI 2006-AR7, CMLTI 2007-WFH1, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have material exceptions (CHASE 2006-A1, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average foreclosure duration. A two-sample median test is conducted to test the significance of the difference in median foreclosure duration, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

APPENDIX D4

Summary of Foreclosure Duration Model Results [1]

Beckles Material Exception Flag

	Include Deal Indicator Variables	Apply Beckles Disaster Moratoria Adjustment	Model with All Loans		Model with Loans in Judicial States		Model with Loans in Non-Judicial States	
			Coefficient [2]	Approximate Additional Days of Foreclosure [3]	Coefficient [2]	Approximate Additional Days of Foreclosure [3]	Coefficient [2]	Approximate Additional Days of Foreclosure [3]
Panel A: Exclude Censored Loans								
	N	N	0.001	0.4	-0.002	-2.0	0.003	1.6
	Y	N	0.002	1.5	-0.002	-1.3	0.007	3.3
	Y	Y	0.003	1.7	-0.001	-0.8	0.007	3.4
Panel B: Include Censored Loans [4]								
	N	N	0.003	2.2	-0.002	-2.0	0.007	3.5
	Y	N	0.005	3.1	-0.003	-2.2	0.010	5.1
	Y	Y	0.005	3.3	-0.002	-1.7	0.010	5.2

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19; U.S. Department of Labor, Bureau of Labor Statistics; U.S. Census Bureau; U.S. Department of Housing and Urban Development; Federal Housing Finance Agency

Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with last payment date not exceeding the date of first REO or liquidation. Excluded from the model are four deals for which Ms. Beckles stated that some or all of the final exception reports were unavailable or not in a useable form (MABS 2006-AM2, MABS 2006-AM3, HEAT 2005-2 and HEAT 2005-4) and two deals for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are seven deals for which Ms. Beckles' material exception flag could not be matched to Corelogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, CMLTI 2005-HE1, CMLTI 2006-AR7, CMLTI 2007-WFH1, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have material exceptions (CHASE 2006-A1, JPMAC 2006-CH1, and JPMAC 2006-CH2) are included.

[2] Coefficients are estimated from an Accelerated Failure Time (AFT) regression where the dependent variable is the natural log of foreclosure duration in days, calculated as the number of days between the last payment date and the first liquidation or REO, as determined by Ms. Beckles. The model controls for the following factors: period of last payment date, LTV as of the last payment date, borrower credit score, loan balance as of the last payment date, loan product type, loan purpose, property type, occupancy status, state, change in housing price index during the year leading up to the last payment date, and change in unemployment rate during the year leading up to the last payment date. Loans with zero or missing balance as of the last payment date are excluded. A "*" indicates that the coefficient is statistically significant at the 5% level.

[3] Approximate Additional Days of Foreclosure is calculated as the product of the material exception flag coefficient and the average foreclosure duration for loans with material exceptions in the given regression sample.

[4] Censored loans are identified as loans that are either at least 90 days delinquent or in foreclosure as of the last observed status in Ms. Beckles' data but have not yet been identified as liquidated or REO. Loans in bankruptcy as of their last observed status are also included if the loan is identified as having been at least 90 days delinquent or in foreclosure immediately prior to bankruptcy. Foreclosure duration for censored loans is calculated as the difference between the last payment date and the first day of the month associated with the last observed status in Ms. Beckles' data.

EXHIBIT 1

Summary of Loss Severity Rates [1]

Loans with Uncured Exceptions vs. Loans without Uncured Exceptions

	Loans with Uncured Exceptions [2]	Loans without Uncured Exceptions [2]	Difference [3]
Average Loss Severity Rate	70.3%	71.9%	-1.6% *
Median Loss Severity Rate	70.5%	71.6%	-1.1% *
Number of Loans	9,206	62,842	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19
Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Loss severity rates are taken from Ms. Beckles' data and are defined for a given loan as the losses reported in the month of liquidation divided by the unpaid balance as of the month of liquidation.

[2] Loans with and without uncured exceptions are identified by Ms. Beckles. Two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are four deals for which Ms. Beckles' uncured exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have uncured exceptions (CHASE 2006-A1, CMLTI 2005-HE1, CMLTI 2006-AR7, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average loss severity rate. A two-sample median test is conducted to test the significance of the difference in median loss severity rate, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

EXHIBIT 2

Summary of Foreclosure Duration [1]

Loans with Uncured Exceptions vs. Loans without Uncured Exceptions

(duration figures in days)

	Loans with Uncured Exceptions [2]	Loans without Uncured Exceptions [2]	Difference [3]
Average Foreclosure Duration	591	615	-24 *
Median Foreclosure Duration	397	427	-30 *
Number of Loans	9,206	62,842	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19

Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Foreclosure duration is calculated as the number of days between the last payment date and the first liquidation or REO, as determined by Ms. Beckles.

[2] Loans with and without uncured exceptions are identified by Ms. Beckles. Two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are four deals for which Ms. Beckles' uncured exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have uncured exceptions (CHASE 2006-A1, CMLTI 2005-HE1, CMLTI 2006-AR7, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average foreclosure duration. A two-sample median test is conducted to test the significance of the difference in median foreclosure duration, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

EXHIBIT 3

Summary of Foreclosure Duration Net of GSE Guidelines [1]

Loans with Uncured Exceptions vs. Loans without Uncured Exceptions

(duration figures in days)

	Loans with Uncured Exceptions [2]	Loans without Uncured Exceptions [2]	Difference [3]
Percent of Loans Exceeding Guidelines	62%	63%	-1% *
Panel A: All Liquidated/REO Loans			
Average Foreclosure Duration Net of GSE Guidelines	175	186	-11 *
Median Foreclosure Duration Net of GSE Guidelines	35	46	-11 *
Number of Loans	9,206	62,842	
Panel B: Loans with Foreclosure Duration Exceeding Guidelines			
Average Foreclosure Duration Net of GSE Guidelines	333	348	-14 *
Median Foreclosure Duration Net of GSE Guidelines	160	187	-27 *
Number of Loans	5,683	39,627	

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19

Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Foreclosure duration net of GSE guidelines is calculated by Ms. Beckles.

[2] Loans with and without uncured exceptions are identified by Ms. Beckles. Two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are four deals for which Ms. Beckles' uncured exception flag could not be matched to CoreLogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have uncured exceptions (CHASE 2006-A1, CMLTI 2005-HE1, CMLTI 2006-AR7, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[3] A "*" indicates that the difference is statistically significant at the 5% level. A two-sample t-test is conducted to test the significance of the difference in average foreclosure duration. A two-sample median test is conducted to test the significance of the difference in median foreclosure duration, and the conclusions do not qualitatively change when using the more strict two-sample Wilcoxon rank sum test.

EXHIBIT 4

Summary of Foreclosure Duration Model Results [1]

Beckles Uncured Exception Flag

	Include Deal Indicator Variables	Apply Beckles Disaster Moratoria Adjustment	Model with All Loans		Model with Loans in Judicial States		Model with Loans in Non-Judicial States	
			Coefficient [2]	Approximate Additional Days of Foreclosure [3]	Coefficient [2]	Approximate Additional Days of Foreclosure [3]	Coefficient [2]	Approximate Additional Days of Foreclosure [3]
Panel A: Exclude Censored Loans								
	N	N	-0.004	-2.5	-0.010	-8.2	0.000	0.2
	Y	N	-0.006	-3.7	-0.006	-4.7	-0.002	-0.9
	Y	Y	-0.006	-3.5	-0.006	-4.5	-0.002	-0.8
Panel B: Include Censored Loans [4]								
	N	N	0.007	4.3	0.003	2.9	0.010	4.6
	Y	N	0.004	2.6	0.007	5.9	0.007	3.2
	Y	Y	0.004	2.6	0.007	5.8	0.007	3.3

Source: *CoreLogic*; Beckles Revised Supplemental Report Production Materials dated 9/27/19; U.S. Department of Labor, Bureau of Labor Statistics; U.S. Census Bureau; U.S. Department of Housing and Urban Development; Federal Housing Finance Agency

Note:

[1] Includes loans identified by Ms. Beckles as first lien loans, having gone through a foreclosure that ended in REO or liquidation, and with a last payment date not exceeding the date of first REO or liquidation. Two deals are excluded for which Ms. Beckles has no foreclosure timeline data (MABS 2005-FRE1 and SURF 2007- BC1). Further excluded are four deals for which Ms. Beckles' uncured exception flag could not be matched to Corelogic for at least 90% (rounded to the nearest whole percentage point) of loans: CMLTI 2005-10, GSAA 2007-1, WAMU 2007-OA2 and WAMU 2007-OA6. Deals identified by Ms. Beckles for which no loans have uncured exceptions (CHASE 2006-A1, CMLTI 2005-HE1, CMLTI 2006-AR7, JPMAC 2006-CH1 and JPMAC 2006-CH2) are included.

[2] Coefficients are estimated from an Accelerated Failure Time (AFT) regression where the dependent variable is the natural log of foreclosure duration in days, calculated as the number of days between the last payment date and the first liquidation or REO, as determined by Ms. Beckles. The model controls for the following factors: period of last payment date, LTV as of the last payment date, borrower credit score, loan balance as of the last payment date, loan product type, loan purpose, property type, occupancy status, state, change in housing price index during the year leading up to the last payment date, and change in unemployment rate during the year leading up to the last payment date. Loans with zero or missing balance as of the last payment date are excluded. A "*" indicates that the coefficient is statistically significant at the 5% level.

[3] Approximate Additional Days of Foreclosure is calculated as the product of the uncured exception flag coefficient and the average foreclosure duration for loans with uncured exceptions in the given regression sample.

[4] Censored loans are identified as loans that are either at least 90 days delinquent or in foreclosure as of the last observed status in Ms. Beckles' data but have not yet been identified as liquidated or REO. Loans in bankruptcy as of their last observed status are also included if the loan is identified as having been at least 90 days delinquent or in foreclosure immediately prior to bankruptcy. Foreclosure duration for censored loans is calculated as the difference between the last payment date and the first day of the month associated with the last observed status in Ms. Beckles' data.